

1. A semiconductor package comprising:  
a semiconductor chip;  
a package body formed of a hardened encapsulant material;  
a plurality of metal leads, wherein each lead is electrically connected to the chip;  
a flat metal plate fully encapsulated within said package body, wherein the chip is mounted on the plate and an encapsulated first portion of each of the leads overhangs a periphery of the plate; and  
a plurality of electrically isolated, encapsulated members, wherein each said member extends from a perimeter of the package body toward the plate and overhangs the periphery of the plate and is in a connection with the plate.

2. The package of claim 1, wherein the plate is comprised of copper and has a CuO or Cu<sub>2</sub>O film on all surfaces thereof.

3. The package of claim 1, wherein an electrically insulative, thermally conductive adhesive layer is attached between the first portion of the leads and the plate, and said layer is covered by said encapsulant material.

6. The package of claim 1, wherein each said member extends from a corner of the perimeter of said package body.

7. The package of claim 1, wherein the metal plate is connected to said members by an electrically insulative, thermally conductive adhesive layer.

10. The package of claim 1, wherein the metal plate has a thickness that is at least two times a thickness of said leads.

LAW OFFICES OF  
KJERNEN MORRILL  
MATHERSON LLP

25 METRO DRIVE  
SUITE 700  
SAN JOSE, CA 95110  
(408) 453-9200  
FAX (408) 453-7979

11. The package of claim 1, wherein the encapsulant material is between said plate and the first portion of the leads.

12. A leadframe comprising:

a metal frame including a central region within the frame;

a plurality of metal leads extending from a first end integral with the frame to a second end adjacent to the central region, wherein at least a plurality of the leads increase in width as those leads extend from the frame toward the central region; and

a flat metal plate supported in the central region, wherein a first portion of each said lead overhangs a periphery of said plate.

13. The leadframe of claim 12, wherein the plate is comprised of copper and has a CuO or Cu<sub>2</sub>O film on all surfaces thereof.

14. The leadframe of claim 13, wherein an electrically insulative, thermally conductive adhesive layer is attached between the first portion of the leads and the plate.

16. The leadframe of claim 12, further comprising a plurality of members extending from said frame adjacent to said leads, wherein each said member overhangs the periphery of the plate and is in a connection with said plate.

17. The leadframe of claim 16, wherein each said member extends from a corner of said frame.

18. The leadframe of claim 16, wherein the metal plate is connected to said members by an electrically insulative, thermally conductive adhesive layer.

sub C1  
19. The leadframe of claim 16, wherein each connection is a metal to metal connection between the plate and the respective member.

20. The leadframe of claim 16, wherein the metal plate has a thickness that is at least two times a thickness of said leads.

21. The package of claim 1, wherein at least a plurality of the leads increase in width as those leads extend from the perimeter of the package body toward the plate.

B  
22. The package of claim 21, wherein two leads of increasing width are adjacent and extend from opposite sides of a first corner of the perimeter of the package body, said two leads defining a first slot between them, said first slot extending from the first ends of the two leads to their respective second ends and filled with the encapsulant material.

23. The package of claim 22, further comprising a short tapered metal first member located at the first corner of the perimeter of the package body and extending into the first slot for only a portion of a length of the first slot.

24. The package of claim 1, wherein three of said plurality of encapsulated members each extend diagonally from a first end located at a second corner, a third corner, and a fourth corner, respectively, of the perimeter of the package body to a second end overhanging the periphery of the plate.

sub C1  
25. The leadframe of claim 12, wherein two leads of increasing width are adjacent and extend from opposite sides of a first corner of the frame, said two leads defining an open first slot between them, said first slot extending from the first ends of the two leads to their respective second ends.

LAW OFFICES OF  
SKJERVEN MORRILL  
& MACPHERSON LLP

25 METRO DRIVE  
SUITE 700  
SAN JOSE, CA 95110  
(408) 453-9200  
FAX (408) 453-7979

26. The leadframe of claim 25, further comprising a short tapered metal first member integral with the first corner of the frame and extending into the first slot for only a portion of a length of the first slot.

27. The leadframe of claim 12, further comprising three metal pseudo tie bars each extending diagonally from a first end integral with a second corner, a third corner, and a fourth corner, respectively, of the frame to a second end overhanging the periphery of the plate.

28. The leadframe of claim 27, wherein each pseudo tie bar includes a first portion at the second end overhanging the periphery of the plate, a second portion adjacent to the first end integral with the respective corner of the frame, and a third portion between the second portion and the first portion, wherein the second portion is wider than the third portion and has edges that taper into the third portion.

29. The leadframe of claim 19, wherein each said metal to metal connection is between the respective member and a protrusion from a surface of the plate, and the protrusion is stamped or swaged against the respective member to form the metal to metal connection.

30. A semiconductor package comprising:

a semiconductor chip;

a package body formed of a hardened encapsulant material;

a plurality of metal leads, wherein each lead is electrically connected to the chip;

a flat metal plate fully encapsulated within said package body, wherein the chip is mounted on the plate, and an encapsulated first portion of each of the leads overhangs the periphery of the plate, and the plate has a thickness that is at least two times a thickness of the leads; and

a plurality of encapsulated members, wherein each said member extends from a perimeter of the package body toward the plate, and overhangs a periphery of the plate, and is in a metal to metal connection with a surface of the plate.

31. The package of claim 30, wherein an electrically insulative, thermally conductive adhesive layer is attached between the first portion of the leads and the plate, and the adhesive layer is covered by the encapsulant material.

32. The package of claim 30, wherein the encapsulant material is between said plate and the first portion of the leads.

33. The package of claim 30, wherein a protrusion of the flat metal plate is stamped or swaged against the respective member, thereby forming the metal to metal connection.

34. The package of claim 30, wherein at least a plurality of the leads increase in width as those leads extend from the perimeter of the package body toward the plate.

35. A semiconductor package comprising:

a semiconductor chip;

a package body formed of a hardened encapsulant material;

a plurality of metal leads each electrically connected to the chip, wherein at least a plurality of the leads increase in width as those leads extend from a perimeter of the package body, and wherein two leads of increasing width are adjacent and extend from opposite sides of a first corner of the perimeter of the package body, said two leads defining a first slot between them, said first slot extending from the first ends of the two leads to their respective second ends;

a flat metal plate fully encapsulated within said package body, wherein the chip is mounted on the plate, and an encapsulated first portion of each of the leads overhangs a periphery of the plate, and the plate has a thickness that is at least two times a thickness of the leads;

a metal first member located at a first corner of the package body and extending into the first slot for only a portion of a length of the first slot, the first member being encapsulated by the package body and including intersecting straight edges that taper to a point aligned with a central axis of the first slot; and

three metal pseudo tie bars each extending diagonally from a first end located at a second corner, a third corner, and a fourth corner, respectively, of the perimeter of package body to a second end overhanging the periphery of the plate and each being in a connection with the plate.

b1  
36. The package of claim 35, wherein each pseudo tie bar includes a first portion at the second end overhanging the periphery of the plate, a second portion adjacent to the first end located at the respective corner of the perimeter of the package body, and a third portion between the second portion and the first portion, wherein the second portion is wider than the third portion and has edges that taper into the third portion.

37. (Amended) A leadframe comprising:

a metal frame including four corners and a central region within the frame;

three metal pseudo tie bars each extending diagonally from a first end integral with a second corner, a third corner, and a fourth corner, respectively, of the frame to a second end adjacent to the central region;

a plurality of metal leads each extending from a first end integral with the frame to a second end adjacent to the central region, wherein at least a plurality of the leads increase in width as those leads extend from the frame toward the central region, and wherein two leads of increasing width are adjacent and extend from opposite sides of a first corner of the frame, said two leads defining an open first slot between them,

said first slot extending from the first ends of the two leads to their respective second ends; and

a flat metal plate supported in the central region, wherein the plate has a thickness that is at least two times a thickness of said leads, and wherein a first portion of each said lead overhangs a periphery of the plate, and wherein a first portion of each said pseudo tie bars overhangs the periphery of the plate and is in a connection with the plate.

38. The leadframe of claim 37, wherein an electrically insulative, thermally conductive adhesive layer is attached between the first portion of the leads and the plate.

B 1  
39. The leadframe of claim 37, wherein each of the connections between the plate and the first portions of the tie bars comprises an electrically insulative, thermally conductive adhesive layer.

40. The leadframe of claim 37, wherein each of the connections between the plate and the first portions of the tie bars comprises a metal to metal connection.

41. The leadframe of claim 37, wherein said first slot is between two pair of adjacent leads of increasing width, wherein each said pair includes one of the two leads defining the first slot, and wherein the two adjacent leads of each said pair define an open second slot between them, and each of the second slots has a width, and the width of the second slots each are less than the width of the first slot.

42. The leadframe of claim 37, wherein the first slot increases in width and then decreases in width from the frame toward the central region.

LAW OFFICES OF  
SKJERVEN MORRILL  
MACPHERSON LLP

25 METRO DRIVE  
SUITE 700  
SAN JOSE, CA 95110  
(408) 453-9200  
FAX (408) 453-7979

43. The leadframe of claim 37, further comprising a short tapered metal first member integral with the first corner of the frame and extending into the first slot for only a portion of a length of the first slot.

31  
K  
and

LAW OFFICES OF  
SKJERVEN MORRILL  
MACPHERSON LLP

25 METRO DRIVE  
SUITE 700  
SAN JOSE, CA 95110  
(408) 453-9200  
FAX (408) 453-7979